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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/811,896

03/30/2004

Jin-seok Lee

1572.1246

1334

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7590

05/08/2006

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EXAMINER

ZERVIGON, RUDY

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 05/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/811,896	LEE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Rudy Zervigon	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 21-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>All</u> . | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “gas distributor plate”, “upper central zone”, “upper edge zone”, “lower central zone”, “lower edge zone”, “planar side”, and “control valve” must be shown or the features canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

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The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Applicant's claims require "gas distributor plate", "upper central zone", "upper edge zone", "lower central zone", "lower edge zone", and "planar side". No such components are enumerated in the specification as originally filed.

5. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: How do the unnumerated elements "gas distributor plate", "upper central zone", "upper edge zone", "lower central zone", "lower edge zone", and "planar side" define/interface with the numerated components?

6. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: Applicant's claim 2 requires "central zone". It is unsure which of the "central zones" Applicant refers to in claim 1? "upper central zone" or "lower central zone"

7. Claim 2 recites the limitation “the plate”. There is insufficient antecedent basis for this limitation in the claim.
8. Claims 1, 3 recite the limitation “gas distributor”. There is insufficient antecedent basis for this limitation in the claim.
9. Claim 4 recites the limitation “density of plasma”. There is insufficient antecedent basis for this limitation in the claim.
10. Claim 20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant’s “aluminum alloy” appears to be typographically incorrect.

***Claim Rejections - 35 USC § 102***

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1-4, and 6-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Dhindsa; Rajinder et al. (US 6245192 B1). Dhindsa teaches an etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) for a semiconductor wafer (“semiconductor substrate”; claim 1, Figure 3; not numbered), comprising: a vacuum chamber (“reaction chamber”, claim 1; Figure 3); a support (Figure 3; not numbered) for the semiconductor wafer (“semiconductor substrate”; claim 1, Figure 3; not numbered) in the chamber (“reaction chamber”, claim 1; Figure 3); and a gas injector (26; Figure 4; column 4, lines 10-29), wherein the gas injector (26; Figure

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4; column 4, lines 10-29) comprises: a first gas supplier (64; Figure 4; column 5, lines 13-19), a second gas supplier (60; Figure 4; column 5, lines 13-19) independently (column 5; lines 52-55) providing gas from the first gas supplier (64; Figure 4; column 5, lines 13-19), a gas distributor plate (56b; Figure 4; column 5, lines 13-19) having an upper central zone (upper central part of 56b; Figure 4; column 5, lines 13-19) and an upper edge zone (upper edge part of 56b; Figure 4; column 5, lines 13-19) and a lower central zone (lower central part of 56b; Figure 4; column 5, lines 13-19) and a lower edge zone (lower edge part of 56b; Figure 4; column 5, lines 13-19), and a showerhead (22; Figure 4; column 6, lines 37-55) opposing the gas distributor (assumed “gas distributor plate” 56b; Figure 4; column 5, lines 13-19), wherein an amount of reaction gas supplied to the upper central zone (upper central part of 56b; Figure 4; column 5, lines 13-19) and the upper edge zone (upper edge part of 56b; Figure 4; column 5, lines 13-19) of the gas distributor (assumed “gas distributor plate” 56b; Figure 4; column 5, lines 13-19) is independently (column 5; lines 52-55) controlled, as claimed by claim 1

Dhindsa further teaches:

- i. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) for a semiconductor wafer (“semiconductor substrate”; claim 1, Figure 3; not numbered) according to claim 1, wherein the gas distributor plate (56b; Figure 4; column 5, lines 13-19) has a loop-type (Figure 6) upper partition wall (vertical wall of 78; Figure 4; column 5, lines 21-37) protruding from the central zone of an upper side of the plate (56b; Figure 4; column 5, lines 13-19), and a loop-type (Figure 6) bottom partition wall (86; Figure 4; column 5, lines 21-37) protruding from the central zone of a bottom side of the plate

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- (assumed “gas distributor plate” 56b; Figure 4; column 5, lines 13-19), as claimed by claim 2
- ii. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 1, wherein a first gap (dimension of 78; Figure 4; column 5, lines 13-19) is formed between the gas distributor (assumed “gas distributor plate” 56b; Figure 4; column 5, lines 13-19) and the gas suppliers (60,64; Figure 4; column 5, lines 13-19), and a second gap (see plenums between 56b and 22; not labeled, Figure 5) is formed between the gas distributor plate (assumed “gas distributor plate” 56b; Figure 4; column 5, lines 13-19) and the showerhead (22; Figure 4; column 6, lines 37-55), as claimed by claim 3
  - iii. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 3, wherein at least one of uniformity of density of plasma, deposition speed, and etching speed is controlled – column 6, lines 37-55, as claimed by claim 4
  - iv. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 2, wherein the upper partition wall (vertical wall of 78; Figure 4; column 5, lines 21-37) divides a first gap (dimension of 78; Figure 4; column 5, lines 13-19) into a first central zone (central zone of 56b; Figure 4; column 5, lines 13-19) and a first edge zone (78; Figure 4; column 5, lines 21-37), and the bottom partition wall (86; Figure 4; column 5, lines 21-37) divides a second gap (see plenums between 56b and 22; not labeled, Figure 5) into a second central zone (lower central zone of 56b; Figure 4; column 5, lines 13-19) and a second edge zone (lower edge zone of 56b; Figure 4; column 5, lines 13-19), as claimed by claim 6

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- v. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 6, wherein at least one of uniformity of density of plasma, deposition speed, and etching speed is controlled – column 6, lines 37-55, as claimed by claim 7
- vi. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 6, wherein either one of the gas suppliers (60,64; Figure 4; column 5, lines 13-19) connects to the first central zone (central zone of 56b; Figure 4; column 5, lines 13-19), and the other one connects to the first edge zone (78; Figure 4; column 5, lines 21-37), as claimed by claim 8
- vii. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 8, wherein the first central zone (central zone of 56b; Figure 4; column 5, lines 13-19) has a plurality of first gas distribution holes (central 82s; Figure 4, 5) connected with the second central zone (lower central zone of 56b; Figure 4; column 5, lines 13-19) and passing through a planar side of the gas distributor plate (assumed “gas distributor plate” 56b; Figure 4; column 5, lines 13-19), and the first edge zone (78; Figure 4; column 5, lines 21-37) has a plurality of second gas distribution holes (82s at 56a/b interface; Figure 4) connected with the second edge zone (lower edge zone of 56b; Figure 4; column 5, lines 13-19) and passing through the planar side of the gas distributor plate (assumed “gas distributor plate” 56b; Figure 4; column 5, lines 13-19), as claimed by claim 9
- viii. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 9, wherein the first gas distribution holes (central 82s; Figure 4, 5) are alternately arranged with the second gas distribution holes (82s at 56a/b interface; Figure 4), as claimed by claim 10



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- ix. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 6, further comprising an MFC (MFC1, MFC2; Figure 5) independently (column 5; lines 52-55) controlling amounts of reaction gases respectively supplied into the first central zone (central zone of 56b; Figure 4; column 5, lines 13-19) and the first edge zone (78; Figure 4; column 5, lines 21-37), as claimed by claim 11
- x. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 8, further comprising an MFC (MFC1, MFC2; Figure 5) independently (column 5; lines 52-55) controlling amounts of reaction gas respectively supplied into the first central zone (central zone of 56b; Figure 4; column 5, lines 13-19) and the first edge zone (78; Figure 4; column 5, lines 21-37), as claimed by claim 12
- xi. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 9, further comprising an MFC (MFC1, MFC2; Figure 5) independently (column 5; lines 52-55) controlling amounts of reaction gas respectively supplied into the first central zone (central zone of 56b; Figure 4; column 5, lines 13-19) and the first edge zone (78; Figure 4; column 5, lines 21-37), as claimed by claim 13
- xii. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 6, further comprising a control valve (MFC1,2; Figure 3, 5) independently supplying the reaction gas into the first central zone (central zone of 56b; Figure 4; column 5, lines 13-19) and the first edge zone (78; Figure 4; column 5, lines 21-37), as claimed by claim 14

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- xiii. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 14, wherein the control valve (MFC1,2; Figure 3, 5) is controlled automatically, as claimed by claim 15
- xiv. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 8, further comprising a control valve (MFC1,2; Figure 3, 5) independently supplying the reaction gas into the first central zone (central zone of 56b; Figure 4; column 5, lines 13-19) and the first edge zone (78; Figure 4; column 5, lines 21-37), as claimed by claim 16
- xv. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 16, wherein the control valve (MFC1,2; Figure 3, 5) is controlled automatically, as claimed by claim 17
- xvi. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 9, further comprising a control valve (MFC1,2; Figure 3, 5) independently (column 5; lines 52-55) supplying the reaction gas into the first central zone (central zone of 56b; Figure 4; column 5, lines 13-19) and the first edge zone (78; Figure 4; column 5, lines 21-37), as claimed by claim 18
- xvii. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 18, wherein the control valve (MFC1,2; Figure 3, 5) is controlled automatically, as claimed by claim 19

***Claim Rejections - 35 USC § 103***

- 13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 5, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhindsa; Rajinder et al. (US 6245192 B1) in view of Okayama; Nobuyuki et al. (US 6334983 B1). Dhindsa is discussed above. Dhindsa does not teach:

- i. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 1, wherein a plurality of the gas distributor plates (56a,b; Figure 4; column 5, lines 13-19) are provided between the gas suppliers (60,64; Figure 4; column 5, lines 13-19) and the showerhead (22; Figure 4; column 6, lines 37-55), as claimed by claim 5
- ii. The etching apparatus (Figure 3-5; column 3, line 64 - column 5, line 41) according to claim 9, wherein the gas distributor plate (assumed "gas distributor plate" 56b; Figure 4; column 5, lines 13-19) contains aluminum alloy, and the showerhead (22; Figure 4; column 6, lines 37-55) contains silicon, as claimed by claim 20

Okayama teaches a gas distribution arrangement (Figure 6) for a plasma etching process (column 1, lines 5-10). Specifically, Okayama teaches a gas distributor plate (302; Figure 6; column 12, lines 16-23) contains aluminum alloy, and a showerhead (301; Figure 6; column 12, lines 16-23) contains silicon.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Okayama's preferred materials and to reproduce Dhindsa's gas distributor plate (56b; Figure 4; column 5, lines 13-19).

Motivation to use Okayama's preferred materials and to reproduce Dhindsa's gas distributor plate is for reducing the periodic replacement of Okayama's gas distributor plate (302; Figure 6;

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column 13, lines 30-38), further, it is well established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04).

***Conclusion***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

US 20050145338 A1

US 20030010451 A1

US 20020121342 A1

US 6894245 B2

US 6878206 B2

US 6872258 B2

US 6660126 B2

US 6537419 B1

US 6508197 B1

US 6183563 B1

US 6170428 B1

US 6129806 A

US 6120605 A

US 5950925 A

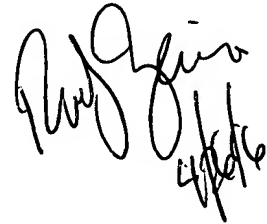
US 5441568 A

US 5006220 A

JP 2005039207 A

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16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

A handwritten signature in black ink, appearing to read 'Rudy Zervigon', with a date '4/26/06' written below it.